

### Abstract

In the light of the disadvantages of the prior art technology, an object of the present invention is to provide a method for producing a synthetic quartz glass member for excimer lasers, which comprises, while suppressing the generation of reductive defects which impairs the resistance against laser radiations, incorporating a sufficient amount of hydrogen molecules capable of achieving a high resistance against laser radiation into the quartz glass, yet uniformly incorporating the hydrogen molecules to realize a flat distribution in refractive indices attributed to the distribution in the density of hydrogen molecules. It is also an object of the present invention to provide a synthetic quartz glass member for excimer lasers obtained by the production method above, which yields high resistance against laser radiations and homogeneity. The above problems have been overcome by a method for producing a synthetic quartz glass member for excimer lasers, which, in a method for producing a synthetic quartz glass member for excimer laser optics comprising a step of incorporating hydrogen molecules into a synthetic quartz glass body by heat treating the synthetic quartz glass body at a temperature of 600 °C or lower under an atmosphere in a pressure range of 1 atm or higher but lower than 150 atm and containing hydrogen, said method comprises varying the pressure of the gas containing hydrogen either continuously or stepwise in at least a part of the heat treatment.

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